SOURCE

B 04 FIRE PROTECTION

The German Fire Protection Requirements must be observed. **LBO**
Furthermore, the uniform construction requirements of the Life Safety Code, **NFPA 101**
the National Fire Protection Association (NFPA) 101 shall be in conformance
with the following requirements. **LBO/MBO**

Resistance requirements and allowable floor area shall be observed in accordance with the UBC-Guidelines UBC = **"UNIFORM BUILDING CODE". UBC**

B 04.1 Non-combustible Construction: **NFPA 101**
Materials and repair methods used for repair of barracks buildings, shall be in **DIN 4 102**
conformance with Type I or Type II of non-combustible construction, definition **LBO/MBO**
as per UBC. The contents of the para below is an exception.

Roof frames are generally timber frames to be maintained. Interior roof sides shall be lined with materials with a fire resistance of not less than 60 minutes (F 60 A and/or F 60-AB).

B 04.1.1 Wall Finishes – Ceiling Finishes **DIN 4102**
The interior plaster and wall finishes for exits, corridors and bedroom areas shall be always in accordance with NFPA Class A and for all other areas NFPA Class A or B.
NFPA Class C material is unacceptable for use in an army site.
Synthetic resin foam and foam is unacceptable for use as interior wall finish in any army site.

If insulation materials of construction material class B 2, e.g. polyurethane insulation elements are found on roofs or in other construction areas during the as-built survey at building, an agreement with HQ-USAREUR shall be achieved upon commencement of design if these insulation materials shall remain in building or need to be dismantled.

HINWEIS:

NFPA: 101 – LIFE SAFETY CODE
Publisher: NATIONAL FIRE PROTECTION Association

Source of supply: Any special bookstore or
National Fire Protection Association
Fulfillment Center
11 Tracy Drive
Avon Ma 02322-9910 oder
Tel.: 1-800-344-3555 oder
http://catalog.nfpa.org

B 01 B 02 B 03 B 04 B 05 B 06 B 07 B 08 B 09 B 10 B 11 B 12 B 13 B 14 B 15

SOURCE

B 04.1.2 Classification of Building Materials

DIN 4102

NFPA-Class A is equivalent with the German classification A 1, A 2, B1.
NFPA-Class B is equivalent with the German classification B 2.
Building materials of the German classification B 2 and B 3 are **not** acceptable in real estates of forces.

Building Material Class	Official Description
A	incombustible building material (nbr)
A 1	incombustible building material (nbr)
A 2	incombustible building material (nbr)
B	combustible building material (br)
B 1	flame retardant building material
B 2	normal flammable building material
B 3	easily flammable building material

Building material to be installed shall be in conformance with criteria in the table below and must be provided with the proof as required in this table.

Building material class	**Additional Criteria**		**Proof through:**
A 1	standard building material without combustible elements	non-standard building materials	DIN 4102 Part 4 test certificates
	with combustible elements (≤ 1%)		test certificate with test label
A 2	standard building material		DIN 4102 Part 4
	non-standard building material		test certificates with test label
B 1	standard building material		DIN 4102 Part 4
	non-standard building material		test certificates with test label
B 2	standard building material		DIN 4102 Part 4
	non-standard building material		test certificates

Only construction products and construction types shall be used which correspond to the requirements of law. The legal requirements to construction products and construction types are prescribed in **construction standard lists. Only products shall be installed and/or procedures used which are listed in the construction standard list A, construction standard list B.**

B 01 B 02 B 03 B 04 B 05 B 06 B 07 B 08 B 09 B 10 B 11 B 12 B 13 B 14 B 15

SOURCE

B 04.2 Building Elements / Hazardous Areas

B 04.2.1 Corridors:

Corridor criteria for all applications for barracks repair use are based upon more than 16 occupants per floor.
The corridor must be considered as corridor to the exit. Under considerations of these criteria, corridor walls shall have a fire resistance time of 60 minutes **(F 60)** and shall be designed as part of the fire protection closure of the floor. **DIN 4102**
Doors leading from living/bedrooms to corridors shall be provided acc. to **B 07.4.4**
US American regulations with a fire resistance time of 20 minutes. Doors to be installed same as described in **B 07.4.4.**

B 04.2.2 Ceilings/Ceiling Break-thrus

Floor ceilings are ceiling sections; they shall be constructed with a fire resistance of 90 minutes **(F 90)**.
Openings through ceilings for ventilation, sanitary, electrical and other supply facilities shall serve as fire sections and be in accordance with the fire resistance class of the building element – at least **(F 90)**.

Ceilings constructions taken over from as-built shall be renovated in such a manner that they achieve the fire resistance class **F 90.** The renovation shall be accomplished essentially with plasters. Bottom sided fire protection coverings are **not** desired.

B 04.2.3 Staircases (max. 3 Floors)

Staircase walls for a maximum of three floors require a fire resistance time of 90 minutes **(F 90)**. **NFPA 101**

Accesses to corridors shall be equipped with automatically closing fire protection doors acc. to DIN 18082 in fire resistance class and with smoke protection **(T 30/RS).** The entire door structure must have a construction authority permit and must be identified with a test label.

Doors shall be provided with electro-magnetic hold open devices (wall mounted arrestor magnet) and must be connected to the fire alarm system. Arrestors integrated in overhead door closers are unacceptable.

Signage at fire section doors see **B 09.3** Page 192

SOURCE

B 04.2.4 Staircases (for 4 and More Floors)

Staircase walls for four and more floors require a fire resistance time of two hours *). A staircase with a basement underneath the exit level, one floor on the exit level and two floors above the exit level, requires a fire resistance time of two hours *). **(F 120).** Staircase walls shall be constructed with a fire resistance time of 90 minutes **(F 90).** The building height up to high riser limit is insignificant.

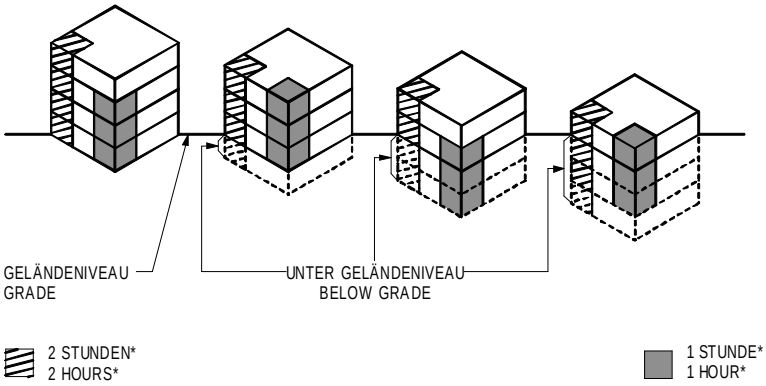
Access means from the staircase to corridors shall be equipped with automatically closing fire doors (**T 30/RS)**. the entire door construction shall have a construction supervision permit and marked with a test label or constructed acc. to DIN standard.
Doors shall be provided with electro-magnetic hold open devices (wall mounted arrestor magnet) and must be connected to the fire alarm system. Arrestors integrated in overhead door closers are unacceptable.

Staircases from 1st floor to the basement shall be bricked-up with an independent stairwell and equipped with doors. The doors shall correspond to the fire protection class of building type.

The drawing below **(fig. 04.1)** shows the allocation of fire resistance time with reference to the number of floors for staircases.

NFPA 101
Section 6-2

Fig. 04.1



B 04.2.4.1 Stairwells – smoke exhausts:

The American fire protection regulations do not provide smoke exhausts. If the German regulations are requiring smoke exhausts, these shall be installed. The floor numbering shall be then accomplished acc. to German criteria.

*) EXPLANATION:
US test requirements call for two hours, German test requirements, however, 90 minutes. Building elements are therefore executed according to **F 90.** The above depicted **fig. 04.1** shall be applied accordingly.

NFPA 101

B 01
B 02
B 03
B 04
B 05
B 06
B 07
B 08
B 09
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B 11
B 12
B 13
B 14
B 15

SOURCE

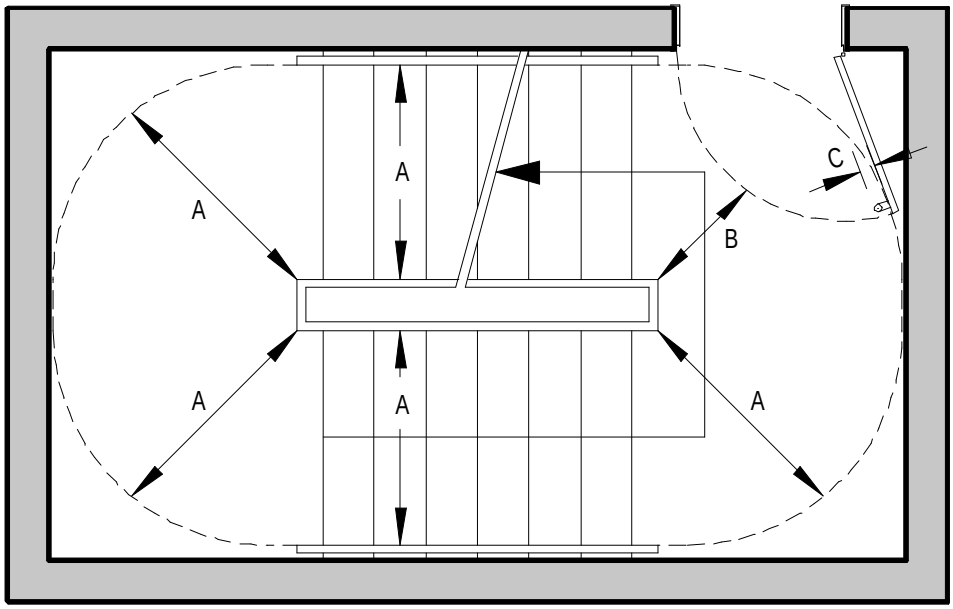
B 04.2.4.2 Staircase systems

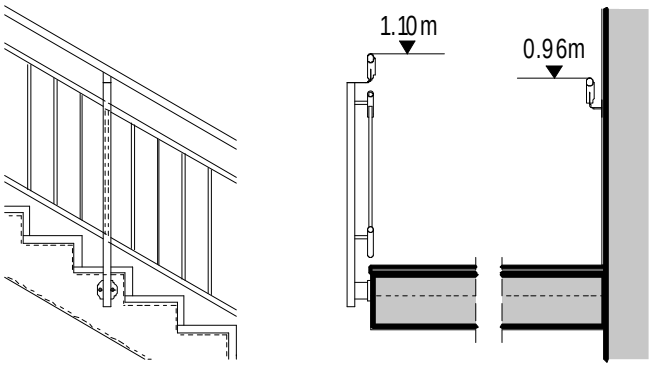
The drawing below **(fig. 04.2)** depicts a typical staircase. The shown dimensions shall be observed. All other dimensions are governed by the standard for building stairs DIN 18 065. The stair structure shall meet the fire resistance requirements for the applicable staircase, see **(fig. 04.1)**

NFPA 101
DIN 18 065

Spiral stairs shall **not** be constructed.

Fig. 04.2





Hand rail:

wall side	0.96 m
stair well	1.10 m

SOURCE

B 01

Following listed dimensions shall be observed at **new** staircase systems:

B 02

Tread width minimum size 27.9 cm
Rise height maximum size 17.8 cm

Existing staircase systems:
If staircase systems are taken over from as-built and/or used further and integrated in design, following dimensions shall be observed:

B 03

Tread width minimum size 25.4 cm
Rise height maximum size 19.1 cm

B 04

If the deviations are only minor below or above the permissible dimensions at existing stairs, it shall be agreed with USAREUR prior to commencement of design if these stairs can remain.

B 05

B 04.2.5 Hazardous Areas **NFPA 101**

The hazardous areas existing in billet buildings are laundry room, janitor's closets and mechanical rooms, also if they area located scattered on floors.
A fire resistance time of 60 minutes **(F 60)** is specified for walls off this room.

B 06

B 04.2.6 Finishing of Attics

B 07

Windows in bedrooms and dayrooms which serve as escape routes shall have clear dimensions equivalent to the size of a square, with side lengths of 0.90 m. They shall be completely openable from the inside without tools. The bottom edge of the clear opening shall not be located more than 1.20 m above the floor level. Windows in pitched roofs or roof structures or an exit in front – measured horizontally – shall not be located more than 1.00 m away from the eaves. edge.

B 08

B 09

If roof exits or roof dormers are used whose dimensions are minor deviating from the above listed, it shall be coordinated with USAREUR upon commencement of design if these can remain.

B 10

In areas designated for installation of storage bin rooms (soldier's luggage) existing windows shall be maintained accessible and provided as escape openings to the outside. Openings shall not be obstructed with storage bin rooms.

B 11

If there are no escape openings in these areas, at least one escape opening in shape of a roof dormer with vertical standing window with rotary wing or a garret window shall be installed in each section, sections max. every 40 m.

B 12

B 04.2.6.1 Access to upper attics (telescopic ladders)
Accesses to upper attics – installed in constructions with fire resistance duration of F 90, F 60-A, F 60-AB, shall be accomplished at least in fire resistance duration **F 30.**

B 13

Allowed are telescopic ladders with a construction supervisory allowance of fire resistance class **F 30**.

B 14

Escape route lengths shall be observed – see **fig. 04.3**

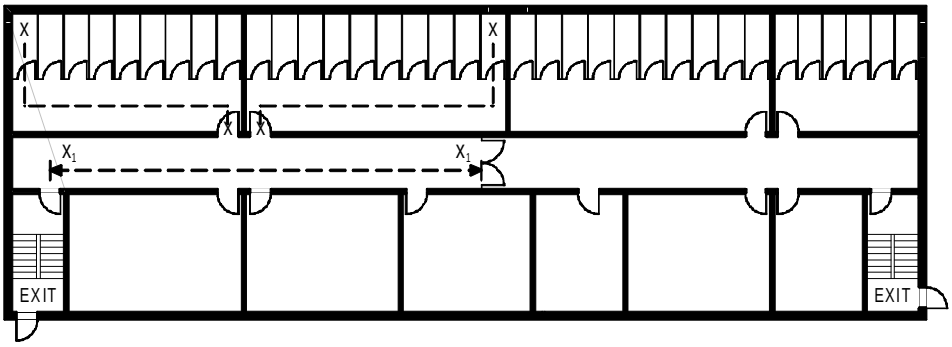
B 15

SOURCE

Fig. 04.3

x - x = max. 23.00m

x_1-x_1 = max 38.00m



SOURCE

B 04.3 EXITS, ESCAPE and RESCUE ROUTES, FIRE SECTIONS

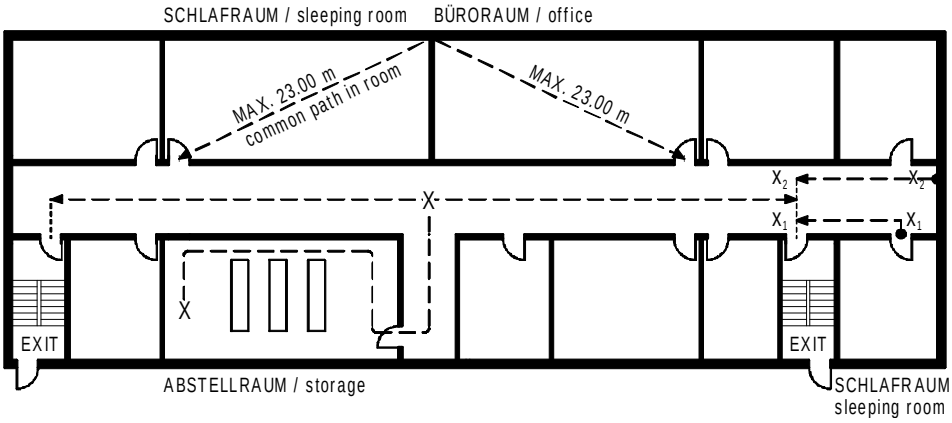
B 04.3.1 Doors (Building Exits):
Doors of building exits shall not be equipped with panic hardware, they must be openable from inside without a tool. Each floor shall have at least two exits. Locking see table. **B 07**

B 04.3.2 Lighting Exit Ways: See **B 14.1.7**
Exit ways shall be illuminated and marked.

B 04.3.3 Common Path:
A common path is that section of the access to the exit that has to be covered, before two clearly separate ways, leading to two exits, are available. The common path ends at the point, where two ways are accessible. **Fig. 04.4** shows a common path in a building. The maximum length of the common path from a bedroom door amounts to 10.7 m and/or with sprinkler 15.00 m. **NFPA 1997**

Fig. 04.4

x-x = max. 15.00 m
Common path for storage
x_1-x_1 = max. 10.70 m without sprinkler, max. 15.00 m with sprinkler
Common path room door
x_2-x_2 = max. 10.70 m without sprinkler, max. 15.00 m with sprinkler
Dead end



B 04.3.3.1 Fire Sections / Smoke Sections **LBO / MBO**
Fire walls shall be erected every 40 m inside buildings (provision of fire sections).

If there are no fire sections, building corridors (exit ways) shall be divided into smoke sections in distances of max. 45 m. **NFPA 101**

B 01 B 02 B 03 B 04 B 05 B 06 B 07 B 08 B 09 B 10 B 11 B 12 B 13 B 14 B 15

SOURCE

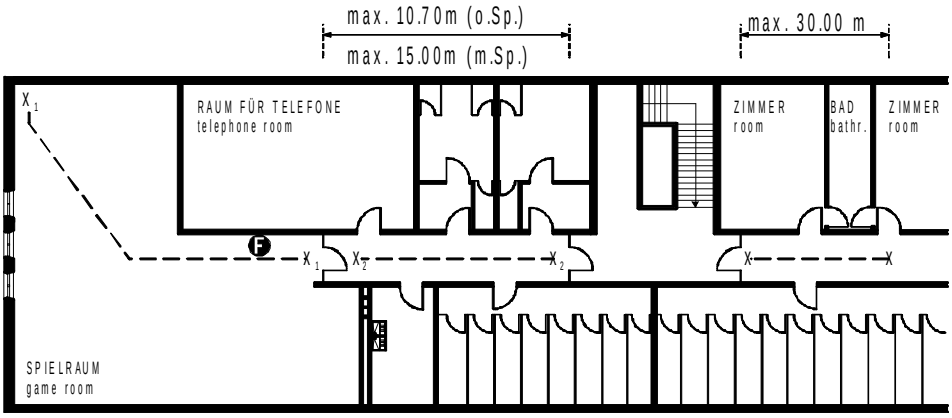
If covering areas at attics are constructed in fire resistance class F 90-A, no smoke sections shall be constructed acc. to American fire protection regulation. If the covering areas of attics are constructed in fire resistance class F 60 and/or F 60-AB, the upper attic floors shall be divided into smoke sections. Maximum size of a smoke section is 280 m². Calculation size is the dimension of floor layout.

B 04.3.4 Distance to the Exit:
The maximum distance to an exit amounts to 30 m. This distance is measured from the bedroom door to the exit enclosure. The access door to an emergency staircase will be considered as the exit enclosure **(Fig. 04.5)**.

Fig. 04.5

x-x = max. 30.00 m
Travel distance from room door to exit
x_1-x_1 = max. 23.00 m
Common path in room
x_2-x_2 = max. 10.70 m without sprinkler, max. 15.00 m with sprinkler
Common path from room door

F Standort Feuerlöscher / firepoint



SOURCE

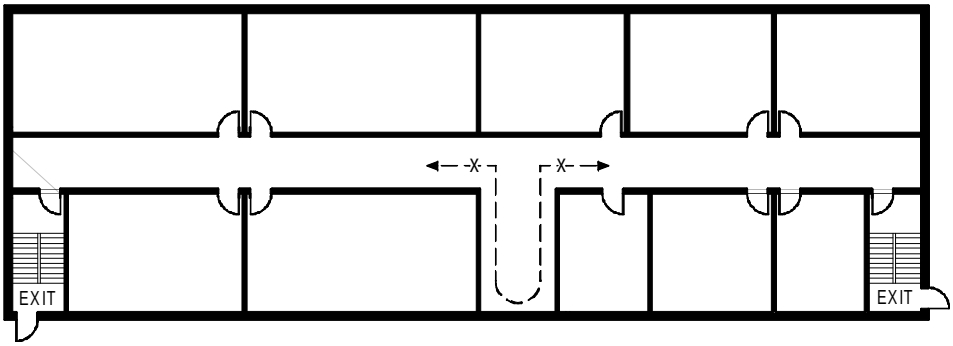
B 04.3.5. Corridor with dead end:

B 04.3.5.1 Dead End Corridors:
A dead end corridor is a corridor or an area, which can be mistaken by an occupant as a way to an exit. Since there is no exit, the occupant has to cover the same distance to reach an exit.
Fig. 04.6 depicts such a dead end corridor.
The maximum distance in a dead end corridor shall not amount to more than 15.00 m (with sprinkler).

Dead end corridors shall be identified accordingly by signage.

Fig. 04.6

x-x = max. 10.70 m without sprinkler, max. 15.00 m with sprinkler
Dead end



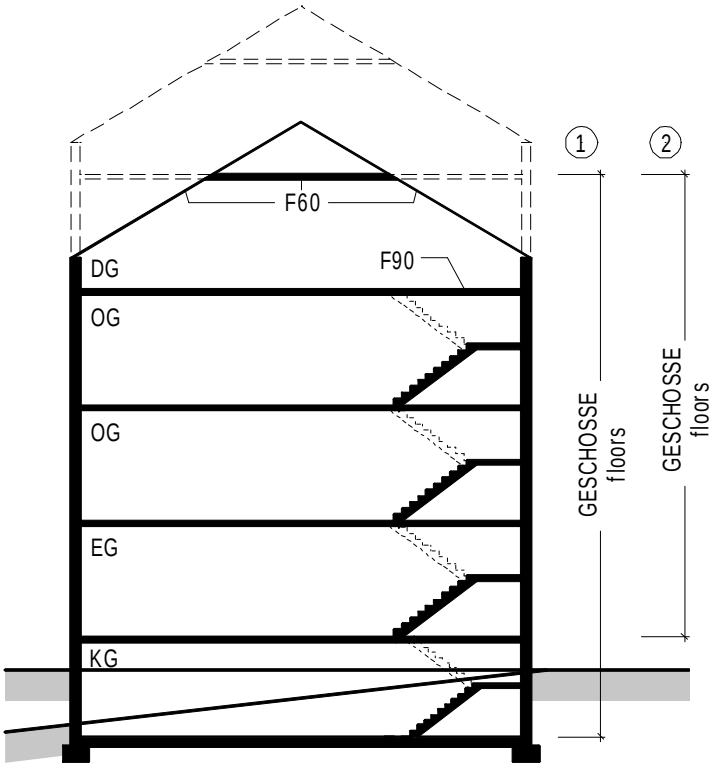
SOURCE

B 04.3.5.2 Definition of Floors:

Basements that are accessible through continuous internal stairs are considered as floor (1). If the basement is accessible from outside and has no direct connection to the ground floor, it shall not be incorporated in the floor calculation (2) **(Fig. 04.7)**. See also **Fig. 04.1.**

All floors with access to staircases count as floor.

Fig. 04.7



B 04.3.5.3 Building Exits (with Basement)

Exit doors shall be arranged to provide a three-sided fire transmission distance around the door of at least 3.00 m, measured from door edges and 3.00 m upwards – measured from exit level.

SOURCE

B 01

B 04.3.5.4 Emergency Stairs / Exterior stairs

In case of emergency stairs on exterior building sides, distances and/or fire resistance times to windows or other openings as stated in **Fig. 04.8 and 04.9** shall be observed.

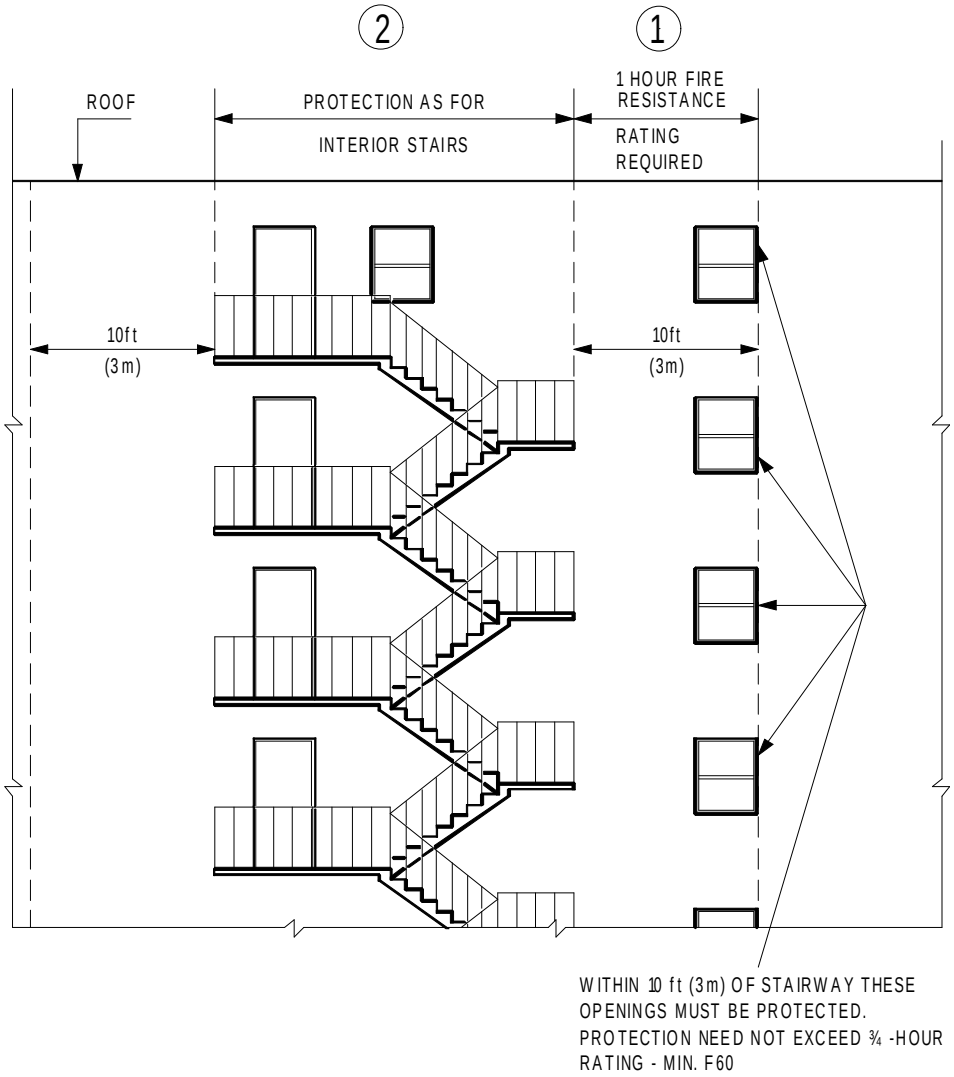
NFPA 101

B 02

Elevation exterior stair

Fig. 04.8

B 03



B 04

B 05

B 06

B 07

B 08

B 09

B 10

B 11

Up to 3 story = 1 hr / T30
Over 3 story = 2 hr / T30
Sprinkler = 2 hr / T30

B 12

Openings in area **(1)** must be protected, fire resistance of 45 minutes **(F 60)**.
The wall structure in area **(1)** shall have a fire resistance of 60 minutes **(F 60).**
In area **(2)** the same requirements apply to the exterior wall as the interior staircases. See **(Fig. 04.1)**

B 13

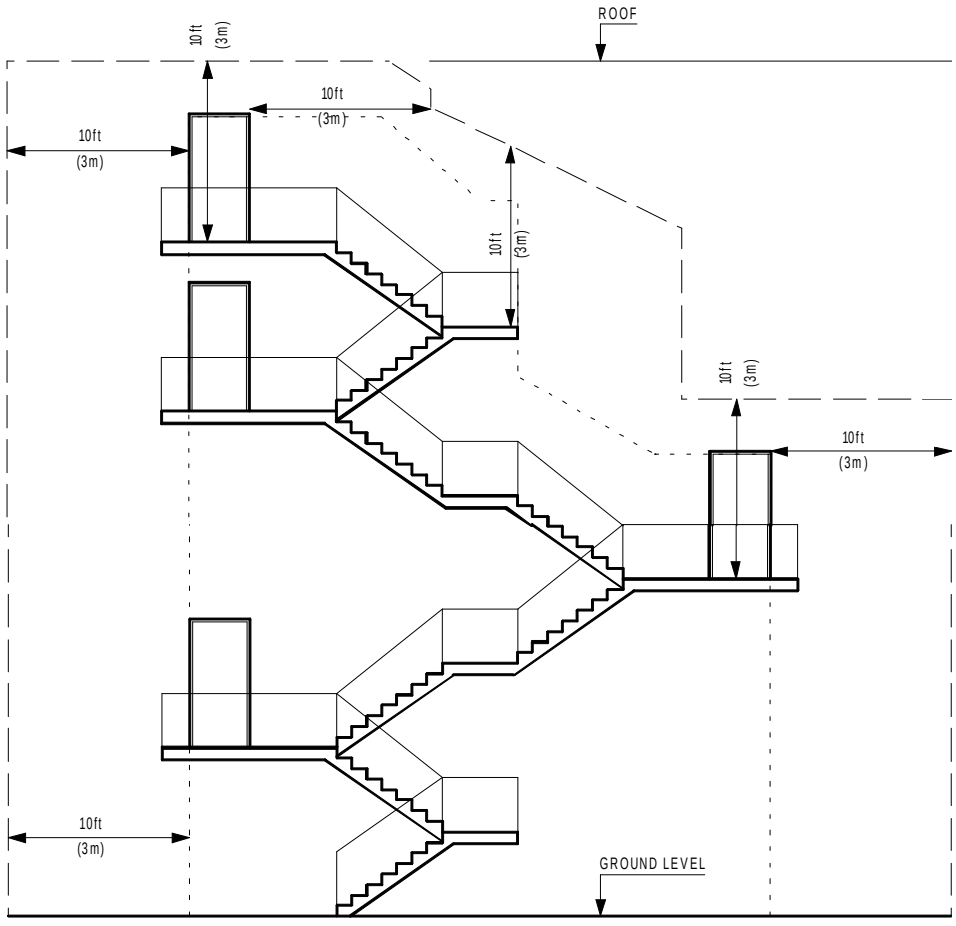
B 14

B 15

Protected areas of exterior staircase, **Fig. 04.9**

SOURCE
NFPA 101

Fig. 04.9



Scope of Protection:
Openings in the intermediate area of the short dotted – long dotted pointed lines shall be protected, fire resistance at least 45 minutes *) **(T 30, F 30 etc.).**

Openings within the area of **short dotted pointed** line shall be protected in buildings with up to three floors for **60 minutes (T 30, F 30 etc.)** and at buildings with more than 3 floors for **90 minutes (T 90, F 90).**

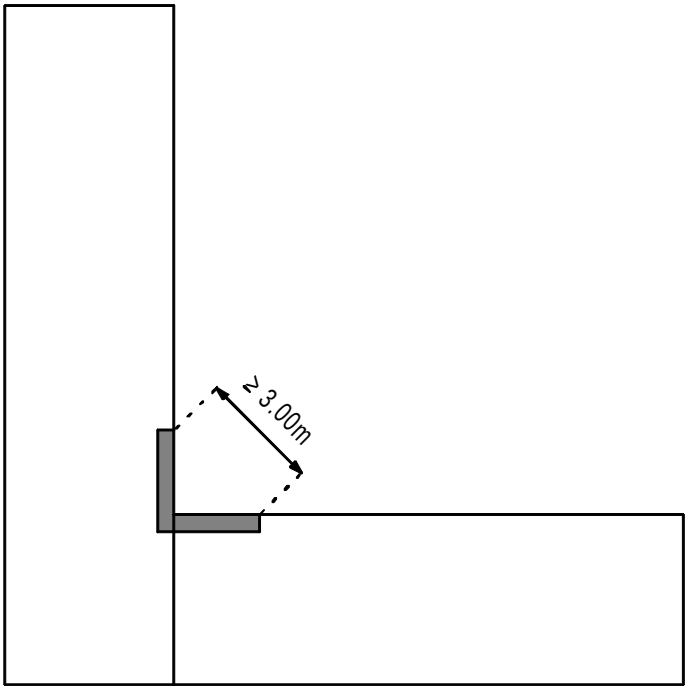
*) NOTE:
According to U.S. test requirements, 45 minutes and 60 minutes are equivalent with the German classification **T 30, F 30** etc.
90 minutes are equivalent with the German classification **T 90, F 90** etc.

SOURCE

B 04.3.5.5 Buildings / corner flash-over:

The above listed representations refer to American fire protection regulations. These shall be observed. **NFPA 101**
German fire protection regulations can demand higher requirements, then these shall be observed.
The wall construction parts shall meet the requirements fire resistance class F 90.
Openings in protected areas shall achieve a fire resistance duration of at least 45 minutes. Construction parts of fire resistance class **T 30, F 30** etc. shall be installed. **DIN 4102**

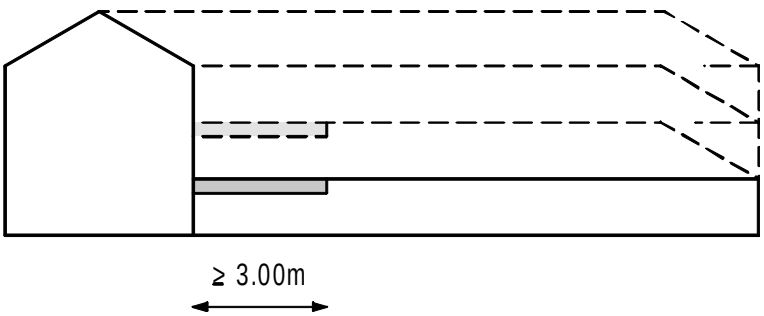
Fig. 04.10



Fire flash-over way lower construction parts / high construction parts:

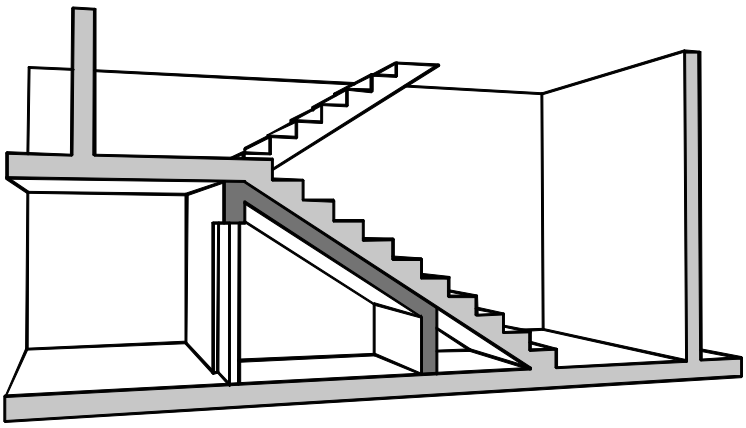
Above mentioned shall be used accordingly for this construction part arrangement. Ceilings shall be made of construction parts of fire resistance class F 90, roofs of fire resistance class F 60. Openings in protection areas are not permissible. Roofings shall be accomplished as hard roofings with incombustible materials.

Fig. 04.11



		SOURCE
B 04.4	**FIRE RATING – STRUCTURAL** **FIRE PROTECTION – PREVENTIVE FIRE PROTECTION**	
B 04.4.1	**Buildings with up to 3 floors shall be finished as follows:**	
Fire resistance classes for Staircase walls and corridor walls		**F 90 A** **DIN 4102**
Corridor walls		**F 60 A**
Ceiling structures Stairs and platforms		**F 90 A** **DIN 4102**
Staircase enclosure doors, doors in corridors for section division fire resistance class **T 30/RS** – smoke protection		**T 30/RS** **DIN 4102**
B 04.4.2	**Buildings with more than 3 floors**	
Fire resistance class for: staircase walls corridor walls		**F 90 A** **F 90 A** **DIN 4102**
Ceiling structures Stairs and platforms		**F 90 A** **DIN 4102**
Staircase enclosure doors, doors in corridors for section division fire resistance class **T 30/RS** – smoke protection		**T 30/RS** **DIN 4102**
B 04.4.2.1	**Finishing of Attics**	
In case of finishing of attics, the entire interior covering of roof structure shall correspond to fire resistance class **(F 60-A and/or F 60-AB)**		**DIN 4102**
B 04.4.2.2	**Finishing of Rooms under Stairs**	
The finishing of rooms under stairs shall be avoided. If such rooms are unavoidable, the following described criteria shall be observed.		
Rooms under stair systems must receive self-contained ceilings, the flight of stairs shall not represent the ceiling of a room. The self-contained sealing of room shall correspond at least to fire resistance class of staircase facility. Such rooms shall not be provided with an access from stairwell.		

Fig. 04.12 **Storage rooms below stairs**



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B 13
B 14
B 15

SOURCE

B 04.4.3 Preventive fire protection:
Five systems for fire fighting will be used in troop billet buildings, in addition to fire detection systems.

1. Sprinkler systems	see	**B 13** Page 287
2. Extinguishing facility kitchens	see	Page 95
3. Dry lines acc. to DIN 14 461, part 2	see	**B 13.3** Page 307
4. Mobile fire extinguishers **(provided by US Army)**		
5. Above ground hydrants in exterior facilities	see	**B 13.4** Page 308

B 04.4.3.1 Sprinkler systems:
All buildings will be equipped with sprinkler systems. The details concerning the accomplishment and measurement of systems are described in chapter **B 13.** **B 13**

B 04.4.3.2 Extinguishing facility kitchens:
Each kitchen shall be equipped with an extinguishing facility. **B 12.9.3**
Extinguishing system type GUARDIAN 21 CENT
System allowance shall exist.
The device shall have the system allowance UL-allowance-no. EX 3940.

Product TOTAL-WALTHER
Wachhausstraße 1
76227 Karlsruhe

B 04.4.3.3 Dry lines / wall hydrants:
Dry lines with wall hydrants will be installed in stairwells in all buildings – independent from number of floors. Each dry line (per stairwell) shall be constructed with a feeding opening at the building exterior side. Connection union, standard connection **(group B)**, see **Fig. 04.14**. Page 30

A wall hydrant **(Fig. 04.15)** shall be installed in the stairwell of each floor (not behind the door). The wall hydrant consists of a common sheet metal cabinet, two doors. Following is included in it:

1 hose connection coupling, standard connection **(Group C)** without hose, without hasp.
1 built-in box part with door and glass inspection window for installation of an American fire extinguisher. The fire extinguishers will be delivered and installed by US Army.

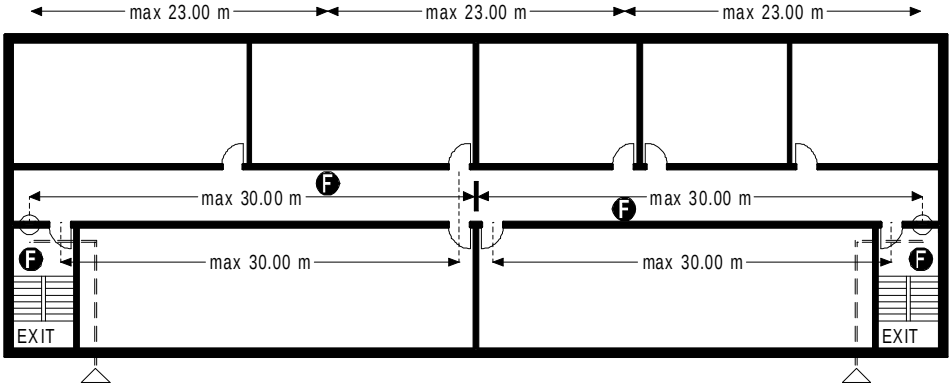
Arrangement of wall hydrants acc. to schematic layout.
If the distances are more than 60.00 m among each other, it shall be coordinated with USAREUR upon commencement of design start if a further dry line will be installed in building. **(Fig. 04.13)**

Construction criteria see **B 13.3**

B 01 B 02 B 03 B 04 B 05 B 06 B 07 B 08 B 09 B 10 B 11 B 12 B 13 B 14 B 15

SOURCE

Fig. 04.13 **Scheme layout wall hydrants**
Arrangement fire extinguisher
Arrangement feeding dry line



Wall hydrant in stairwell
DIN 14461 Part 2

Feeding / dry line

Feeding facility / building exterior side
DIN 14461 =Part 2

F Location fire extinguisher / firepoint

B 04.4.4 Fire extinguisher installation rules:

Fire extinguishers shall be provided in corridors. The arrangement and maximum distances among each other are shown in **Fig. 04.13.**
Each one fire extinguisher shall be provided additionally in game room of attic and in mechanical area of basement.
All fire extinguishers shall be placed in recess-mounted cabinets, except in mechanical area. Recess-mounted cabinets only for fire extinguishers analog **(Fig. 04.15)**.

Recess-mounted cabinets shall be installed flush mounted and have a glazed opening or plexiglass doors to quickly reveal the presence of equipment. The door shall be identified with a pictograph.
Mounted on the wall, above room door height and/or suspended from ceiling, the fire extinguisher shall be clearly identified with a sign, indicating the location of the fire extinguisher from a far distance.
Identification as per standard with the pictograph **FIRE EXTINGUISHER.**

The recess-mounted cabinet shall be capable of accommodating U.S. fire extinguishers. Size and type of the fire extinguishers can be obtained from the U.S. Community.

The remaining wall in the area of recess-mounted cabinet shall not be adversely affected in its fire resistance class.

SOURCE

The exterior frames of these recess-mounted cabinets shall match the tile arrangement of corridor and stairwell tiles. Feeding facilities are to be installed on the exterior side of the building, in every stairwell.

Feeding facility see (**Fig. 04.14**):

Product	**FSG**
Article No.	326
Dimensions	Width 70cm, Height 70cm, Depth 30cm

To be installed in stairwell, per floor:

Fire extinguisher cabinets with facility for taking-out, see (**Fig 04.15**):

Product	**FSG**
Article No.	321 B 12 So.
Exterior frame dimensions	Width 35.5cm, Height 124cm, Depth 26cm

Fire extinguisher cabinets shall be installed in corridors in spacings of max. 23 m as above, however, without facility for taking out.

Product	**FSG**
Article No.	401 B 12 So.
Exterior frame dimensions	Width 35.5 cm, Height 74cm, Depth 26cm

Fig. 04.14

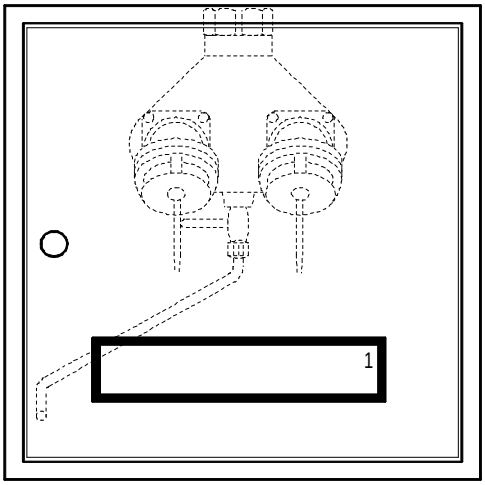
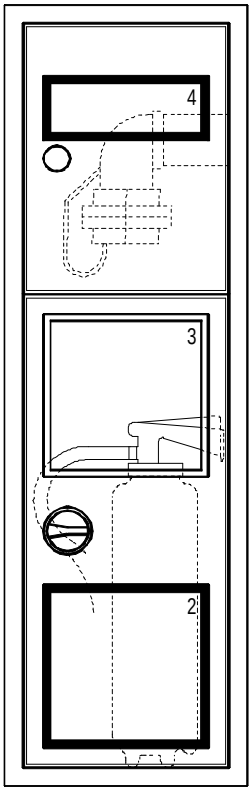


Fig. 04.15



1 = Lettering “Extinguishing water feeding“
2 = Pictograph “Fire extinguisher”
3 = Inspection window
4 = Lettering “Riser line, dry for Fire Department“
(Lettering shall be accomplished in English language)